EBGN557 - Integer Programming

Spring 2012

Lectures        Monday, Wednesday  11:00am - 12:15pm  211 Engineering Hall
Instructor      A. M. Newman
Office:         319 Engineering Hall
Office Hours:   Monday             12:30pm-2:30pm
                Tuesday             5:00pm-8:00pm
email:          newman@mines.edu
Teaching        Dónal O’Sullivan, Ady Van Dunem
Assistants     Office:              215 Engineering Hall
(TAs)           Office Hours:       Monday             2:30pm-3:30pm

GENERAL INFORMATION

• Textbooks:

• Assignments: There will be a weekly assignment due on Wednesday in class the following week. Please direct any homework grading questions to the TAs, who will be grading the homework assignments. *Do not send email to the TAs!!*

• Project: There will be a project involving formulating, solving and analyzing a challenging problem, writing code, and/or performing a literature review. The project group may consist of between one and four students. The project will be due during finals week and should relate to your thesis work, if applicable.
- **Exams**: There will be a midterm and a final examination. Both are open book. You must wait 48 hours after the exam has been handed back to ask (me) any grading questions.

- **Grading**:
  
  * Class Participation: 5%
  * Homework Assignments: 20%
  * Project: 25%
  * Midterm: 20%
  * Final: 30%

Grading is done on a curve where 90% is sufficient but not necessarily necessary for an A-, 80% is sufficient but not necessarily necessary for a B-, etc.

**COURSE OUTLINE**

- **I. Integer Programming Formulations**
  
  * Textbook applications
  * Real-world case studies

- **II. Tractability of Integer Programming Models**
  
  * Total unimodularity
  * Network models versus integer and linear programs

- **III. Branch-and-bound**
  
  * The “vanilla” algorithm and its complexity
  * Reading the node log from a computer

- **IV. Cutting Planes and Strong Formulations**
  
  * Valid and useful inequalities
  * Tightening a formulation
  * Algorithmic parameter settings

- **V. Lagrangian Relaxation**
VI. Benders Decomposition

Computer Implementation

★ Model implementation will be emphasized throughout the course (using AMPL as a modeling language – as in EBGN555, 556, and 552).

RULES

• Please do not send email regarding homework problems; come to office hours instead.

• Statute of limitations for questions about grading is one week from the student’s receipt of the graded work.

• Do not harass the TAs.

• I do not want to see or hear your cell phone. Ever. This includes during office hours.

• No rudeness of any kind towards anyone in the class will be tolerated.

• Do not talk to your neighbor during class.

• You may confer with others regarding the homework and project, but the work you hand in must be your own. Please ensure it is done neatly.

• Attendance in class is required. Be on time.

• Any alternate arrangements for exams must be submitted in writing at least one week in advance of the exam. Any additional arrangements regarding disabilities must be formally and legally documented and approved.

A minor infraction of the above rules will result in a warning. A major infraction will result in expulsion from the class.